

REMARKS

Summary of Office Action

Claims 1, 3-8, 10-12, 14-18, 20-22, 24, 26-37 were pending in this application.

Claims 1, 3-7, 12, 14-17, 26, 28, 29, 33 and 35 were rejected under 35 U.S.C. § 103(a) as being obvious from Gorecki U.S. Patent Application Publication No. 2004/0071205 ("Gorecki"). Claims 22, 31 and 36 were rejected under 35 U.S.C. § 103(a) as being obvious from Jaynes et al. U.S. Patent Application Publication No. 2005/0047779 ("Jaynes"). Claims 8, 10, 11, 24, 27, 32, 34 and 37 were rejected under 35 U.S.C. § 103(a) as being obvious from Gorecki in view of Lu U.S. Patent No. 6,275,836 ("Lu"). Claims 18, 20, 21 and 30 were rejected under 35 U.S.C. § 103(a) as being obvious from Hillery U.S. Patent No. 6,178,201 ("Hillery") and Wang et al. U.S. Patent No. 6,693,958 ("Wang") in view of Gorecki.

Summary of Applicants' Reply

Applicants have amended claims 1, 8, 12, 18, 20, 21, 24, 26-28, 30 and 32-37 and have added new claims 38-44 in order to particularly define the claimed invention. Applicants have canceled claims 17, 18, 29 and 31 without prejudice. No new matter has been added and the amendments and the new claim are fully supported by the originally-filed application. (See, e.g., applicants' specification at FIGS. 3-5.)

Applicants respectfully traverse the Examiner's rejections.

Applicants' Reply

Claims 1, 3-7, 26 and 33

Claims 1, 3-7, 26 and 33 were rejected under 35 U.S.C. § 103(a) as being obvious from Gorecki. This rejection is respectfully traversed.

Applicants' invention, as defined by amended independent claims 1 and 26, is directed to receiver circuitry and methods for adaptively equalizing a data signal. The receiver circuitry and methods include, *inter alia*, programmable circuitry that is programmed with a first value corresponding to a first number of taps. Processing circuitry that computes a second value corresponding to a second number of taps. Selection circuitry that selects one of the first and second values. Equalization implementation circuitry has a selectable number of taps corresponding to the selected value.

Gorecki generally discusses a transceiver that has (1) a transmitter that includes equalization circuitry to provide signal compensation and (2) a receiver that receives a compensated signal from another transceiver. In one implementation of the transmitter, an adaptive algorithm may vary the positioning of the taps, the coefficients of the taps and/or the pulse durations of the taps. In other implementations of the transmitter, a user may program the positioning of the taps, the coefficients of the taps and/or the pulse durations of the taps. (Gorecki, Abstract, page 6, ¶¶ 57, 68 and 69 and pages 9-10, ¶¶ 104, 112 and 114.)

Applicants respectfully submit that Gorecki does not show or suggest a receiver that adaptively equalizes a data

signal, as defined by applicants' claims 1 and 26. The Examiner alleges that Gorecki discusses a data signal received by a transceiver (which includes a transmitter and a receiver) and is equalized by the transceiver (Office Action, page 14). However, Gorecki discusses the incorporation of equalization circuitry in the transmitter of the transceiver and not in the receiver circuit of the transmitter (Gorecki, ¶ 57). Moreover, Gorecki does not show or suggest incorporating the equalization circuitry into the receiver circuit since the receiver is provided with an already equalized signal from a transmitter in a different transceiver (Gorecki, ¶ 61). Thus, Gorecki does not show or suggest equalizing a data signal in a receiver.

Additionally, applicants respectfully submit that Gorecki does not show or suggest equalization implementation circuitry having a selectable number of taps that corresponds to a selected one of the first and second values provided by programmable or processing circuitries respectively, as defined by applicants' claims 1 and 26. Instead, Gorecki discusses the equalization circuitry having one leading tap and one trailing tap which have programmable coefficients, positioning and/or pulse durations and does not show or suggest that the number of taps used in the equalizer correspond to a selected value (Gorecki, ¶ 16). In particular, the equalizer in Gorecki has a predefined number of taps whereas the taps defined by applicants' claimed equalizer correspond to a selected one of the values received by programmable or processing circuitries.

Therefore, Gorecki does not show or suggest all the features of applicants' claims 1 and 26. Accordingly,

applicants respectfully submit that independent claims 1 and 26 and claims 3-7 and 33 that depend, directly or indirectly from claim 1 or 26, are allowable.

Claims 8, 10, 11, 27 and 34

Claims 8, 10, 11, 27 and 34 were rejected under 35 U.S.C. § 103(a) as being obvious from Gorecki in view of Lu. This rejection is respectfully traversed.

Applicants' invention, as defined by amended independent claims 8 and 27, is directed to receiver circuitry and methods for adaptively equalizing a data signal. The receiver circuitry and methods include, *inter alia*, programmable circuitry that is programmed with a first value indicating a first selection between integer spacing and fractional spacing of the taps. Processing circuitry that computes a second value indicating a first selection between integer spacing and fractional spacing of the taps. Selection circuitry that selects one of the first and second values. Equalization implementation circuitry that selects the tap spacing of a filter corresponding to the selected value.

Lu generally discusses an interpolation filter. A controller determines whether integer or fractional interpolation ratio is needed and actuates the appropriate switches. Whether integer or fractional interpolation ratio is used depends on the incoming sample rate. (Lu, Abstract and col. 7, lines 15-25.)

First, as discussed above with respect to claims 1 and 26, Gorecki does not show or suggest a receiver that adaptively equalizes a data signal. Thus, Gorecki does not

show or suggest these features defined by applicants' claims 8 and 27.

Second, the Examiner acknowledges that Gorecki does not show or suggest programmable circuitry and processing circuitry for allowing selection between integer spacing and fractional spacing and cites Lu as making up for this deficiency (Office Action, page 9). However, Lu does not show or suggest tap spacing of a filter that are selected to correspond to a value indicating selection between integer spacing and fractional spacing of the taps, as defined by applicants' claims 8 and 27. Instead, Lu discusses the selection of fractional or integer sampling rates of an interpolation filter and does not show or suggest the selection between integer and fractional filter tap spacing, as required by applicants' claims. Thus, Lu does not make up for the deficiencies of Gorecki in that regard.

Therefore, Gorecki and Lu, whether taken alone or in combination, do not show or suggest all the features of applicants' claims 8 and 27. Accordingly, applicants respectfully submit that independent claims 8 and 27 and claims 10, 11, 27 and 34 that depend, directly or indirectly from claim 8 or 27, are allowable.

Claims 12, 14-16, 28, 35

Claims 12, 14-16, 28 and 35 were rejected under 35 U.S.C. § 103(a) as being obvious from Gorecki. This rejection is respectfully traversed.

Applicants' invention, as defined by amended independent claims 12 and 28, is directed to receiver circuitry

and methods for adaptively equalizing a data signal. The receiver circuitry and methods include, *inter alia*, programmable circuitry that is programmed with a first starting value and outputs the first starting value and a control signal. Processing circuitry that computes a second starting value and outputs the second starting value in parallel with the first starting value. Selection circuitry that receives the control signal and the first and second starting values in parallel and selects one of the first and second starting values based on the control signal.

First, as discussed above with respect to claims 1 and 26, Gorecki does not show or suggest a receiver that adaptively equalizes a data signal. Thus, Gorecki does not show or suggest these features of applicants' claims 12 and 28.

Second, applicants respectfully submit that Gorecki does not show or suggest (1) programmable circuitry that is programmed with and outputs a first starting value and a control signal and (2) processing circuitry that computes and outputs a second starting value in parallel with the first value, as defined by applicants' claims 12 and 28. The Examiner alleges that in Gorecki any of the two circuitries (user programmable and adaptive algorithm circuitry) can be used and that the claims do not require the two circuitries to be in the same implementation (Office Action, page 14). However, as applicants previously argued, Gorecki discusses that the taps can be adjusted in accordance with an adaptive algorithm in one implementation, or pre-programmed by the user in another, different implementation (Gorecki, ¶¶ 68 and 69).

Therefore, the starting values of the taps are adjusted (if at all) at different points in time which is different from applicants' claims which require the programmable circuitry and the processing circuitry to output respective first and second starting values in parallel (i.e., at the same time) and thereby to be present in the same implementation.

Finally, applicants respectfully submit that Gorecki does not show or suggest selection circuitry that receives a first starting value from programmable circuitry and a second starting value from processing circuitry in parallel and selects one of the received starting values, as defined by applicants' claims 12 and 28. The Examiner alleges that multiplexers 1016 and 1018 of FIG. 11 is the same as applicants' claimed selection circuitry (Office Action, page 3). However, multiplexers 1016 and 1018 are used to select whether to equalize the data symbol 1006 using the output of one tap 1008a versus another tap 1008b of the equalizer and not to select between starting values that are received in parallel (i.e., at the same time) from programmable circuitry and from processing circuitry. In particular, nowhere does Gorecki show or suggest that one of taps 1008a and 1008b is pre-programmed while the other tap is computed, as required by applicants' claims.

Accordingly, applicants respectfully submit that independent claims 12 and 28 and claims 14-16 and 35 that depend, directly or indirectly from claim 12 or 28, are allowable.

Claims 20-22, 30 and 36

Claims 22, 31 and 36 were rejected under 35 U.S.C. § 103(a) as being obvious from Jaynes. Claims 20, 21, and 30 were rejected under 35 U.S.C. § 103(a) as being obvious from Hillery and Wang in view of Gorecki. This rejection is respectfully traversed.

Applicants' invention, as defined by amended claims 22 and 30, is directed to receiver circuitry and a method for adaptively equalizing a data signal. The receiver circuitry and methods include, *inter alia*, programmable circuitry that is programmed with a first training pattern and outputs the first training pattern and a first control signal. Training pattern circuitry that computes a second training pattern and outputs the second training pattern in parallel with the first training pattern. Selection circuitry that receives the first control signal and the first and second training patterns in parallel and selects one of the first and second training pattern based on the first control signal.

The Examiner alleges that in Jaynes shows (1) programmable circuitry programmed with a first training pattern, (2) training pattern circuitry that computes a second training pattern and (3) selection circuitry that selects one of the first and second training patterns (Office Action, page 7). Applicants respectfully submit that Jaynes does not show or suggest selection circuitry that receives a first training pattern from programmable circuitry in parallel with a second training pattern from training pattern circuitry, as defined by applicants' claims 22 and 30. Instead, Jaynes

discusses that an external process or operator provides a training signal but nowhere does Jaynes show or suggest that the two alleged training patterns are provided in parallel. Moreover, nowhere does Jaynes show or suggest a selection circuit that receives a first training pattern in parallel with a second training pattern and selects one of the first and second training patterns based on a control signal.

Hillery and Wang were cited by the Examiner as allegedly showing other features of the claims and do not make up for the deficiencies of Jaynes relative to the rejection. Additionally, for the reasons set forth above with respect to claims 1, 12, 26 and 28, Gorecki does not make up for the deficiencies of Jaynes, Hillery or Wang relative to the rejection.

Accordingly, applicants respectfully submit that claims 22 and 30, and claims 20, 21 and 36 that depend, directly or indirectly, from claim 22, are allowable.

Claims 24, 32 and 37

Claims 24, 32 and 37 were rejected under 35 U.S.C. § 103(a) as being obvious from Gorecki in view of Lu. This rejection is respectfully traversed.

Applicants' invention, as defined by amended independent claims 24, 32 and 37, is directed to receiver circuitry and methods for adaptively equalizing a data signal. The receiver circuitry and methods include, *inter alia*, programmable circuitry that is programmed with a first value corresponding to a first sampling point location and outputs the first value and a control signal. Processing circuitry that computes a second value corresponding to a second sampling

point location and outputs the second starting value in parallel with the first starting value. Selection circuitry that receives the control signal and the first and second values in parallel and selects one of the first and second values based on the control signal.

As discussed above with respect to claims 1, 12, 26 and 28 Gorecki does not show or suggest (1) a receiver that adaptively equalizes a data signal, (2) programmable circuitry that is programmed with and outputs a first value and processing circuitry that computes and outputs a second value in parallel with the first value and (3) selection circuitry that receives a first value from programmable circuitry and a second value from processing circuitry in parallel. Thus, Gorecki does not show or suggest these features defined by applicants' claims 24, 32 and 37. Lu was cited by the Examiner as allegedly showing other features of applicants' claims and does not make up for the deficiencies of Gorecki relative to the rejection.

Accordingly, applicants respectfully submit that claims 24, 32 and 37 are allowable.

New Claims

Applicants have added new claims 38-44 in order to more particularly point out and distinctly claim the subject matter applicants regard as the invention. New claims 38-44 depend, directly or indirectly, from claim 1, 8, 22, 26-28 or 30 and therefore also are allowable.

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Conclusion

For the reasons stated above, applicants respectfully submit that this application is in condition for allowance. Reconsideration and prompt allowance of this application are accordingly respectfully requested.

Respectfully submitted,

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